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Andrew M. Weiner

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EXAMINER

TRAN, DZUNG D

ART UNIT

PAPER NUMBER

2613

DATE MAILED: 10/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 09/865,028 | | WEINER, ANDREW M. | |
| | Examiner | | Art Unit | |
| | Dzung D. Tran | | 2613 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-24,49,70,73,74,77 and 80-83 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-24,49,70,73,74,77 and 80-83 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 1, 3-24, 49, 70, 73, 74, 80 and 81 recite the limitation "the polarization transfer matrix of multiple regions " in line 7 of claim 1. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 3-11, 17-19, 49, 73, 74 and 77 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent no. 6,275,623 to Brophy et al. (hereinafter Brophy).

Regarding claims 1 and 77, Brophy discloses in figure 1, an optical processing system comprising: a dispersive element (40) positioned to receive the optical signal (i.e., optical signal from circulator 20) wherein the optical signal is distorted by the frequency dependent polarization effects that cause wavelength dependent changes in

the state of polarization (SOP) of the optical signal (Figures 1 and 2, col. 3, lines 8-13, col. 4, line 55 to col. 5, line 3, col. 5, lines 34-52) and spatially separate frequency components of the optical signal (Col. 5, lines 4-15), a spatial light modulator (50) having multiple regions (i.e. pixels) with an independently adjustable polarization transfer matrix (Figure 3, Col. 6, lines 10-19), the SLM positioned to receive (Col. 5, lines 16-23) the spatially separated frequency components on the multiple regions and a controller (62) coupled to the SLM, wherein during operation the controller causes the SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion (i.e., improve signal to noise ratio) of optical signal (col. 2, lines 17-19, lines 32-42, col. 3, lines 20-25, and col. 5, lines 24-33).

Regarding claims 3 and 4, Brophy discloses the frequency-dependent polarization effects include polarization mode dispersion (PMD) effects and the polarization mode dispersion (PMD) effects can be represented by a frequency-dependent polarization transfer matrix characterized by a frequency-dependent differential delay and principle state of polarization (Col. 2, lines 26-43).

Regarding claims 5-8, Brophy discloses multiple signals on separate wavelength bands (i.e. WDM, Col. 1, lines 52-55), includes at least one optical fiber (12 of Fig.1), recombining (via 42 of Fig. 1) following adjustment and monitoring (via 60 of Fig. 1) the frequency-dependent polarization effects.

Regarding claim 9, Brophy discloses the adjustments by the spatial light modulator are in response to the monitoring of the frequency-dependent polarization effects (e.g. 50 is adjusted by 62 in response from 58 and 60 of Fig. 1).

Regarding claim 10, Brophy discloses the spatial dispersion of the frequency components comprises a prism (32 of Fig. 1 (not labeled), Col. 4, lines 59-61) or grating (40 of Fig. 1, Col. 5, lines 12-15).

Regarding claim 11, Brophy discloses the spatial light modulator comprises at least one liquid crystal layer (e.g. since it's a liquid crystal modulator, it comprises at least one liquid crystal layer, Col. 3, lines 40-42).

Regarding claims 17-19, Brophy discloses an adjustment to phase (Col. 2, lines 17-19, lines 32-42, Col. 3, lines 20-25 and Col. 5, lines 24-33).

Regarding claim 49, Brophy discloses using the SLM to selectively vary the intensity (Col. 2, lines 17-19, lines 32-42, Col. 3, lines 20-25 and Col. 5, lines 24-33).

Regarding claims 73-74, Brophy discloses the adjustments are selected to cause the phase (i.e. direction) of the at least some of the frequency components to be substantially the same and vary substantially linearly with frequency (e.g. by via filters which impart linear spectral phase sweeps on x and y polarized components, col. 3, lines 8-13, col. 4, line 55 to col. 5, line 3, col. 5, lines 34-52)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 12-16, 20-24 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent no. 6,275,623 to Brophy et al. (hereinafter Brophy) in view U.S. Patent No. 5,719,650 to Wefers (hereinafter Wefers).

Regarding claims 12-16, Brophy discloses all the limitations except for the spatial light modulator comprises at least two liquid crystal wherein the axis for one of the LC layers is different from the axis of another of the LC and the axes differ from one another by an absolute amount of about 45 degrees.

Wefers discloses the spatial light modulator (figures 1, 2) comprises at least two liquid crystal layers (col. 3, lines 44-45, col. 11, lines 11-12) or three liquid crystal layers (col. 12, lines 1-12) wherein the axis for one of the LC layers is different from the axis of another of the LC layers (e.g., first axis is disposed at 0 degree relative to polarization axis, second axis angled at about 42-48 degree relative to first axis and fourth axis is axis angled at about 90 degree relative to polarization axis) and the axes differ from one another by an absolute amount of about 45 degrees (col. 4, lines 4-14).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the spatial light modulator of Brophy to include at least two liquid crystal layers as taught by Wefers in the system of Brophy. One of ordinary skill in the art would have been motivated to do this in order to reduce the cross-talk and noise interference between the wavelengths.

Regarding claim 20, Wefers discloses the adjustments to the polarization transfer matrix are selected to cause an adjustment to at least one of the phase, the state of

polarization and amplitude of each of multiple subsets of the spatially dispersed frequency components (col. 1, lines 31-45, col. 5, lines 10-44).

Regarding claim 21, Wefers discloses the adjustments caused by the SLM at least partially pre-compensate (e.g., via a controller, col. 6, lines 26-28 and col. 7, lines 44-48) for the PMD.

Regarding claim 22, Wefers discloses the distortions comprise broadening of mean pulse duration (e.g., figure 7 A and col. 6, lines 64-67) in the optical signal, and wherein the adjustments reduce the broadening (e.g., figure 6 B and by pulse shaping, and col. 1, lines 22-63 or by adjusting phases and amplitudes of incident field) caused by the downstream optical system.

Regarding claims 23, 24 and 70, Wefers discloses the adjustments are selected to cause the state of polarization (SOP) of at least some of the frequency components to be substantially the same (i.e., since applying voltages via a controller to each pixel can adjust the polarization for a component of the field (col. 4, lines 49-67), one could have been motivated to select an adjustment to cause the state of polarization (SOP) of at least some of the frequency components to be substantially the same) following transmission through the downstream optical system.

7. Claims 80-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent no. 6,275,623 to Brophy et al. (hereinafter Brophy) in view of Sharp et al. U.S. Patent no. 6,273,571.

Regarding claims 80 and 82, as per claim 1 above, Brophy does not disclose a multiple spatial light modulators optically coupled to one another. Sharp disclose a multiple spatial light modulators 1024 optically coupled to one another (Fig. 3c; col. 11, lines 9-17).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to include the teaching of Sharp in the system of Brophy. One of ordinary skill in the art would have been motivated to do this in order to detect the polarization of the multiple wavelengths. Thus it reduces the cross-talk and noise interference between the wavelengths.

Regarding claims 81 and 83, one skill in the art would understand that the multiple spatial light modulators optically coupled to one another over the light beam can be optically coupled to one another over the fiber.

Response to Argument

3. Applicant's arguments filed on 07/13/2006 have been fully considered but they are not persuasive.

A. Rejection of claims 1, 3-11, 17-19, 49, 73, 74, and 77 are rejected under USC § 102(e) in view of Brophy.

Applicant argues that both claim 1 and claim 77 require: (a) that a specific type of distortion be present in an optical signal and (b) that a particular type of correction be applied to the optical signal using a SLM to reduce the specific type of distortion.

However, the claims 1 and 77 claimed "at least one SLM to reduce the distortion of the optical fiber" which is disclosed on the Brophy's reference as the rejection of claim 1 and 77, "wherein during operation the controller causes the SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion (i.e., improve signal to noise ratio is inherently to reduce the distortion) of optical signal (col. 2, lines 17-19, lines 32-42, col. 3, lines 20-25, and col. 5, lines 24-33)".

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dzung D Tran whose telephone number is (571) 272-3025. The examiner can normally be reached on 9:00 AM - 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dzung Tran
09/29/2006


DZUNG TRAN
PRIMARY PATENT EXAMINER